REMARKS/ARGUMENTS

In the Office Action of May 15, 2003, claims 1-65 were rejected under 35 U.S.C. §103(a) on U.S. Patent 3,970,430 to Reader et al. in view of admitted prior art in the specification, U.S. Patent 4,692,621 to Passaro et al.; U.S. Patent 4,637,729 to Schoch; and U.S. Patent 3,792,272 to Harte et al.

As noted in the introductory portions of the application specification, the sensor assembly and method of the present invention is one designed to overcome the inability of the prior art to provide rapid accurate sensing of small (ppm levels) of NO_2 and NO so as to provide such sensing in real-time. See Col. 1, line 18 through Col. 2, line 26 of the application specification. The need to measure the concentration of such gases rapidly is particularly important when monitoring the breathing gases of a patient to prevent injury to the patient. The need for rapidity requires that the measurement be done on a breath-to-breath basis.

By the present Amendment, independent claims 1, 25, 42, and 56 have been amended to note the structure/steps that provide real-time analysis of the NO_2 and NO content of the breathing gases of the breaths a subject. Claims 1, 25, 42, and 56 now note that the sample chamber has a flow of breathing gases through the chamber during the breaths of the subject. The radiation from the radiation source of the sensor assembly passes radiation through the breathing gases in the sample chamber and a detector receives the radiation passed through the breathing gases. The result is an output signal indicative of the NO_2 content of the breathing gases that is real-time with respect to the breaths of a subject. In independent claims 1 and 42 a subsequent NO measurement step is recited that is also in real-time.

The structure shown and described in the main Reader et al. reference is not a real-time gas analysis sensor/method. It depends on a chemical reaction occurring in a closed cell or closed environment. For the closed cell, see Col. 5, lines 33, 34 with respect to the embodiment shown in Fig. 1 and, particularly, Col. 7, lines 31-37 with respect to the

embodiment of the invention shown in Fig. 3. However, once there is a closed cell or environment, the sampling is no longer real-time. That is, the sampling only reflects what is going on in the cell and not what is occurring outside the cell, such as in the auto exhaust gases and combustion stack gases described in Col. 5, line 27 of the Reader et al. patent.

To practice the Reader et al. teaching, you first seal the sample cell. Once the sample cell is sealed, the teaching of the Reader et al. reference is to introduce an oxygen containing gas into the closed sample cell. See for example, Col. 5, lines 39 et seq. Then, you wait to see what happens in the sample cell. This wait, in the example shown on the abscissa of Fig. 8, is on the order of 8 minutes. This wait is a further disconnect from any real-time measurement of the automotive or combustion exhaust gases. For the application to which the present claims are directed, i.e. the real-time analysis of the breathing gases of the breaths of a subject, a time period of 8 minutes represents 72 to 108 breaths of the subject, for normal breathing rates of 12 to 18 breaths per minute and such time period clearly precludes any breath-by-breath analysis of a subject's breathing gases

The Reader et al. reference thus does not disclose an optical NO_2 detector that can carry out gas detection in real-time with respect to the breaths of a subject as recited for example, in claim 1, line 19 and further provides no assistance to one skilled in the art in overcoming the problem of poor response time in prior art sensors.

The subject matter of amended independent claims 1, 25, 42, and 56 on the other hand describes an "open" sample chamber approach, that is one through which the breathing gases of the subject can flow during the breaths of the subject. The method/apparatus of the claims is thus one that can, in fact, obtain information regarding the breathing gases of a subject on a breath-to-breath, real-time basis.

The following is noted with respect to the specific points of analysis of the Reader et al. reference made in the Office Action. The portion of Col. 11 of the Reader et al. reference identified by the Examiner on page 3 of the Office Action, refers to the dynamics of the chemical reaction occurring in the closed cell. The output of the closed cell

is not "real-time" with respect to the exhaust gases emitted by an internal combustion automobile engine or the stack gases emitted by a combustion source, such as a power plant.

In connection with the summary set out on page 7 of the Office Action, it is correct that the chemical reaction disclosed in the Reader et al. reference is not directed to the detection of NO_2 but rather to the detection of NO. However, it is not believed correct to say that the Reader et al. detector detects, in real-time, the substantially instantaneous NO_2 level in the sample as stated in lines 3 and 4 of the first full paragraph. This is for several reasons. One, as noted above, once a sample is isolated in a sample cell or environment, there is a disconnect between that sample and the source from which it was taken, such as an auto or power plant exhaust. Second, the teaching of the reference is that it is only after the passage of a period of time that you know what has happened in the closed cell and you learn the NO_2 level of the gas sample as the difference between NO_x and NO. This is not substantially simultaneous detection. Nor is it the technique of the claim invention.

The secondary references, do not overcome the shortcomings of the main Reader et al. reference that employs a time consuming chemical reaction for its operation and must have a closed environment or cell for this purpose. As noted in the earlier Amendment, the secondary Passaro et al. patent shows an infrared gas analyzer for measuring gases such as carbon dioxide or anesthetic agents in the breathing gases of a patient. While it would be theoretically possible to employ the structure of the Reader et al. reference in the breathing gas environment of Passaro et al., the need to periodically seal the sample cell and the time required to inject the reagent gas in the sample cell and to allow the chemical reaction to proceed raises a significant, if not total, impediment to such an arrangement. The showing of the Schoch reference does not remove the basic deficiencies of the main Reader et al. reference. The same is true of the Harte et al. reference relating to a modulated light source. There is no indication that a modulated light source would be suitable for the chemically dynamic situation employed by the Reader et al. reference. nor, indeed, would this appear to be the case.

Amended independent claims 1, 25, 42, and 56 are thus deemed to define subject matter patentable over the applied references and to be allowable. The same is true of the claims dependent thereon.

Withdrawal of the rejection of these claims, and the claims dependent thereon is respectfully requested. Passage of the application is similarly requested.

Respectfully submitted,

ANDRUS, SCEALES, STARKE & SAWALL, LLP

Daniel D. Fetterley
(Reg. No. 20,323)

100 East Wisconsin Avenue, Suite 1100
Milwaukee, Wisconsin 53202
(414) 271-7590

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231 on the 15th day of October, 2003.

Daniel D. Fetterley	20,323
Name	Reg. No.
Daniel D. Fetterley	10/15/03
Signature	Date